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TECHNOLOGY REVIEWED

SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE • NOVEMBER 3, 1945

NOV 30 1945
DETROIT

"Loran" Unit

See Page 275

A SCIENCE SERVICE PUBLICATION

PHYSICS

Banish Atomic Dangers

This must be done before peaceful applications can be made. New weapons are believed to be sufficiently terrible to bring peace to the earth.

➤ PEACETIME application of atomic energy or any other scientific research activity will be of no importance whatever to the human race unless the danger of atomic bombs is banished from the earth, Dr. Harold C. Urey, Nobelist in chemistry, formerly of Columbia University and now of the University of Chicago, one of the scientists who worked on the atomic bomb, declared at the American-Scandinavian Foundation luncheon in New York, commemorating the birthday of Alfred Nobel.

The atomic bomb, in Dr. Urey's opinion, is sufficiently terrible to make possible the bringing of peace to the earth, a still unfulfilled hope of Nobel who invented dynamite.

Explaining that even if no improvement were made in the present atomic bomb a thousand of them, if properly placed, would destroy 33 cities of the size of New York, Dr. Urey suggested that with sufficient effort 10,000 bombs could be manufactured as a result of future improvements in known processes.

"If atomic bombs are used in the next war it seems certain that all the principal cities of the world, including those of the United States, will be utterly destroyed, and their inhabitants killed," said Dr. Urey.

By one means or another, Dr. Urey declared, the world must assure that no atomic bombs are made anywhere in the world. None must be in the possession of any government of any kind. We may be sure that if atomic bombs are made in one country they will be made in all industrial countries of the world, and if atomic bombs are made in all these countries the whole world will spend all its days in deadly fear that they will be used. In time, Dr. Urey added, they undoubtedly will be used.

Quoting Maj. Gen. Leslie R. Groves, the Army's director of the atomic bomb project, that it would take from five to ten years for other countries to make atomic bombs, Dr. Urey gave his opinion that if the United States published all its atomic bomb data in detail, it would not shorten the time of foreign production by very much. This is true because it takes time to build plants, and it takes time to operate them.

Much more important than the question of the so-called atomic bomb secret is the policy back of it, Dr. Urey declared, asking:

"Do we intend to engage in an armament race with other countries of the world?"

The only possible solution of the atomic bomb dilemma, Dr. Urey declared, is a superior world government of some kind possessing adequate power to maintain the peace with the various divisions of the world relatively disarmed. This will involve a most efficient inspection service which will detect and report promptly any attempt to produce atomic bombs or other heavy arms and a sufficient police force to prevent such activities. Under this plan neither the countries of the world nor the United Nations organization will have atomic bombs and no one will need to fear them.

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MEDICINE

Athlete's Foot Remedy

Undecylenic acid, zinc salt and ordinary talc are mixed into a dusting powder for prevention of the fungus infection and treatment of mild cases

➤ A NEW remedy and preventive of athlete's foot has been announced by the Navy Department. Chief active ingredient is undecylenic acid, a fatty acid found in sweat.

This acid, its zinc salt and ordinary talc are mixed into a dusting powder for prevention of athlete's foot and treatment of mild cases. Undecyclenic acid and zinc undecylenate in a carbowax base, with water, propylene glycol and triethanolamine makes an ointment for more severe cases of the fungus infection of foot and groin.

The undecylenic preparations proved better than a number of other standard preparations used to combat athlete's foot, including boric-salicylic powder and propionic acid preparations.

Tests involving more than 5,600 Navy men at Fort Pierce, Vero Beach and Melbourne, Fla., were conducted by Comdr. Henry C. Shaw (MC), USNR, of Rochester, N. Y.

Fungus infection of the foot, popularly called "athlete's foot", developed in 28% of trainees who used no prevention. Regular dusting with the new powder cut this to 4%. Under the same conditions 15% developed infection while using powder containing boric and salicylic acids, long a standard preparation for this purpose. Groin infections were cut from 10.3% to 0.7%.

Used as a powder for mild infection and as an ointment for more severe cases, the new preparations proved their value in curing as well as preventing infection. The ointment cured about 90% of moderate and severe foot and groin infections in two or three weeks, and the powder was much more effective than boric-salicylic powder in treating milder cases.

Fungus infections have been among the most stubborn medical problems in the Pacific war, accounting for as high as three-quarters of all sick-bay calls at some tropical bases. Some standard remedies, useful at home, were too irritating in the steaming islands, and none were effective enough to prevent large numbers of men from being kept out of action.

Searching for something better, Comdr. Shaw and two other Naval Reserve Medical Officers, Comdr. Marion B. Sulzberger of New York City and Lt. Comdr. Abram Kanof of Brooklyn, tested several preparations in a careful study in New York City. Undecylenic powder and ointment seemed the best. But because climate and living conditions are important factors in skin diseases, they had to be tested under field conditions in a tropical or subtropical climate.

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Peaches, pears, plums and apples may be canned with honey, in whole or part, instead of sugar, resulting in a delightful distinct flavor.

Harbor seals now are found from Massachusetts to the Arctic, and occasionally off Long Island where they were once abundant.

RADIO

"Loran" Guides Pilots

Vast network using radio, not radar, covers over three-tenths of earth's surface. Locates pilot of plane or ship within a mile or two regardless of weather.

By WATSON DAVIS

See Front Cover

➤ SHIPS and planes plying the international air and sea lanes can locate their positions accurately to within a few thousand feet by means of the "loran" navigation system developed and constructed by joint effort of scientists of the Radiation Laboratory of the Office of Scientific Research and Development, U. S. Navy's Hydrographic Office, Coast Guard, and the United States Army Air Forces.

One of the most tightly held secrets of the war, loran consists of a vast network of radio stations which in effect spread into space an electric stop watch accurate to a millionth of a second. By means of a little box, which aboard airplanes weighs only 35 pounds and should cost about $500 in peacetime production, dancing green lines on a cathode ray tube read by the navigator allow him to place the location of his craft with as great accuracy as is provided by celestial navigation based on shooting the stars or the sun with a sextant.

First put into actual operation late in 1942, loran was one of the secret weapons in fighting German submarines in the Atlantic. Later, as the war was carried to other parts of the globe, loran went to the fighting fronts in the air and on the sea with its radio impulses extending over enemy-held territory in order that bombers and ships alike might navigate safely. Now 70 loran stations spray their signals over three-tenths of the earth's surface. A total of 90,000 loran receiving boxes were ordered for war use on ships and aircraft.

The loran network is an excellent example of successful international cooperation during the war, which, American authorities are confident, can be continued in the peace years if the present stations can be kept in operation and various nations will cooperate in providing new service in the areas which they control. To date the American, British and Canadian governments are operating stations and using the signals for navigation. To operate a station costs approximately $100,000 a year and about $8,000,000 a year would be the world cost of providing this essential and superior navigation aid.

Loran is not radar, but it does use radio. By comparing two radio signals from stations separated by about 400 miles, a navigator can locate exactly the position of the craft on the sea or in the air. Simple charts or tables are used.

The determination of position is based upon very accurate measurement of the difference in the time of arrival of signals from two radio stations operating on a frequency just above the broadcast band. The part of the radio spectrum used is that formerly used by amateurs. Signals of the two transmitting stations are precisely synchronized.

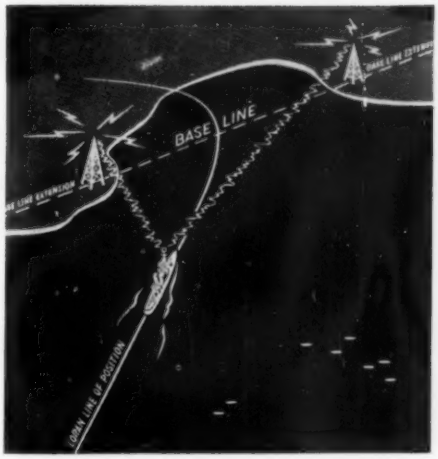
Great Accuracy

The loran receiver determines with great accuracy the difference in the time at which the two signals from the loran transmitting stations are received. Curves are printed on a navigation chart showing the loran lines of position for various time differences. These sweep around the transmitting station's location in the form of hyperbolas. Since the areas of frequent travel by ships and planes are blanketed by the loran signals from several transmitters, the navigator can determine three or four or more such lines of position. Where these lines cross gives the point known as a "fix" which represents on the navigating chart just where the craft is located.

Loran gets its name from the fact that it is a long range aid to navigation (*lo* from long, *r* from range, *a* from aid, and *n* from navigation).

In the daytime loran can be relied upon for 700 miles from the transmitting station, while at night, thanks to the reflection of the signals in the 160-meter band by the ionosphere, reliable determinations of position can be made at twice the maximum daytime range of the transmitters.

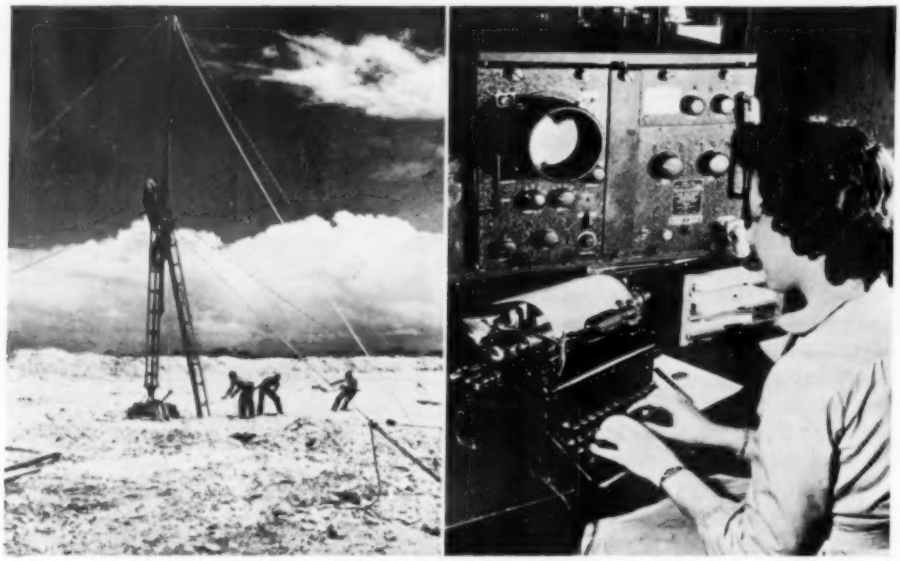
In the fight against submarine warfare, loran was used extensively to enable a ship and an airplane to meet each other. Often in those dark days of the war ships sailed for three and four days, often across the entire Atlantic, relying solely on loran and conventional dead reckoning, because the stars and the sun could not be "shot" in the conventional navigation manner during bad weather. Loran proved much more accurate and safer to use than the ordinary methods of dead reckoning.



ACCURATE—"Loran" enables navigators to place their locations with as great accuracy as is provided by celestial navigation based on shooting the stars or the sun with a sextant. This diagram shows how the impulses go out to ships and planes.

Successful use of airplanes in the foggy Aleutians was due very largely to the installation of loran systems in that area. Loran network and navigation not only kept many transports and cargo planes flying safely but guided bombers and other fighting craft over the Hump in China. As the push was made at extraordinary speed across the Pacific toward Japan, installations of loran stations kept up with the advance. The B-29s that bombed Japan, including the areas of the atomic bombs, were guided on their missions by loran. Altogether about $100,000,000 was spent on loran equipment and installations, but most of this expenditure can be considered an investment for use in building up a world navigation system for sea and air. The cost of research proved to be relatively small, only about 1% of the total.

Only the most severe electrical storms which create a large amount of static will



"LORAN" IN ACTION—On the right is the Loran receiver indicator in use at a monitor station. On the left, a vertical radiator is being erected.

make loran unusable, and accurate positions can be determined even under conditions when other radio signals cannot be deciphered.

The development of loran began in 1940, and it was in an advanced experimental state at the time of Pearl Harbor. The first navigational network was put in operation on Oct. 1, 1942. By the end of 1942, 40 vessels of the Atlantic fleet were fitted with receivers. When the Coast Guard, acting for the Navy, took over the operation of ground transmitting stations in June, 1943, the system was well on its way towards world wide use. In 1943 the Army began installing airborne receivers on bombers.

The British pioneered in developing a pulsed hyperbolic navigation system which they call "Gee" and this method was used in navigating the relatively shorter flights of the RAF over Europe. The inventor of the British system is R. J. Dippy, a small, quiet, former school teacher who worked at the British Telecommunication Research Establishment where major work was also done on radar. Mr. Dippy spent six months collaborating with the American scientists who were developing loran. Loran as developed through American efforts with British cooperation has been put to use not only by our fighting forces, but also the Canadian Navy, the British Navy, and the RAF. Plans are under way whereby loran stations established in other countries, such as Australia, will be taken over and operated by those countries. Canada is already operating stations in Canada.

Principal research and development work on loran was done at the OSRD's Radiation Laboratory of Massachusetts Institute of Technology where Melville Eastham of the General Radio Company of Cambridge, Mass., Dr. J. C. Street of Harvard, J. A. Pierce of Harvard, Dr. J. A. Stratton of M. I. T., and D. G. Fink of Electronics magazine were the principal persons involved. Charts and tables used in loran navigation were produced by the U. S. Navy's Hydrographic Office with Lt. Comdr. F. G. Watson, USNR, formerly at the Radiation Laboratory and earlier on the staff of the Harvard College Observatory, in charge of this work. The U. S. Coast Guard assigned to Capt. L. M. Harding the principal responsibility for supervising the installation of loran transmitting facilities; while the application of loran to air warfare was the work of Maj. Gen. H. H. McClelland and Maj. J. M. Hertzberg. Comdr. Arthur F. Van Dyck, USNR, formerly with RCA, supervised for the Navy the planning of the world-wide network of loran.

The U. S. Coast Guard in conferences to be held shortly is urging the application of loran to merchant marine use as well as for overseas air transport. Along with radar, loran promises to be one of the most important applications of electronics to safety on the sea and in the air. Not only does it provide continuous safe navigation, but permits greater payloads through lower fuel reserve by aircraft.

To give adequate coverage over the travelled areas of the sea and the air a world-wide network of some 150 loran stations would be needed and the maintenance of these is estimated to cost about $20,000,000 a year. Each loran station would cost about $100,000 to construct and about the same amount to operate for a year. Authorities point out that if in addition to fuel savings, safety is increased, resulting in saving of life and property, by the operation of this world system each year, such an annual expenditure would be worthwhile.

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RADIO

Radio Reception Forecast

Predictions made twice a week at National Bureau of Standards were furnished during the war to Army and Navy. Now available to public.

➤ LIKE the weather man, radio experts are "sticking their necks out" in an attempt to predict several days in advance if the radio reception on short-wave sets will be good or bad.

A prediction can be made on Wednesday, for example, that owners of short-wave radio sets will probably have trouble the following Monday and Tuesday getting programs broadcast from Moscow, Stockholm and London.

The semi-weekly forecasts, furnished the Army and Navy during the war, are issued by the Interservice Radio Propagation Laboratory at the National Bureau of Standards. During a magnetic storm, high-frequency transmission may be upset. If the storm becomes violent, however, the reception of local broadcasts may become poor and telegraph messages fail to get through.

The first radio paths to become disturbed are those crossing the polar regions such as from New York City and Washington to Moscow, Stockholm and London.

The predictions are based in part on the degree of solar activity. The greater the number of sunspots—and the public is once again to get up-to-date information on sunspots—the more likelihood there is of a magnetic disturbance.

Disturbance in the ionosphere, the complicated layer more than 50 miles high from which radio waves are reflected back to the earth, are associated with the magnetic storms at lower levels. Thus conditions of the ionosphere as well as geo-magnetic and auroral conditions are all studied in venturing a guess as to just how good the high-frequency reception will be several days in the future.

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AERONAUTICS

Jet-Push Plus Propellers

Combination of conventional propeller-drive and jet-propulsion features new Navy fighting plane; powered by two engines operating together or alone.

➤ SOMETHING new in aircraft propulsion, a new Navy fighting plane equipped both with conventional propellers driven by a reciprocating engine and jet-push from an improved jet propulsion engine, was demonstrated in Washington before a group of scientists by the U. S. Navy, which also released many of the details of the plane and its power plants.

The two engines may be operated at the same time, to give maximum performance, or either may be operated alone. The unique power combination makes the plane equally efficient at high or low levels. It also combines the advantages of good cruising characteristics with high tactical performance.

The reciprocating engine, a Wright Cyclone radial power plant, is in the front of the plane, and the jet-propulsion engine, made by General Electric, is in the rear. This gives an even weight distribution that contributes to the plane's efficiency. The plane, already dubbed the "Fireball," is a low-winged, single-seat monoplane that at first glance appears to be a single-engine craft. Both engines are completely enclosed, and air scoops for the forward engine are within the engine cowling. The air intakes for the jet engine are in the leading edge of the wing near the fuselage, with the jet exhaust opening coming out under the tail.

This new plane is a product of the Ryan Aeronautical Company of San Diego, Calif., and when the war ended was beginning to roll off the production line. A Navy fighter squadron to be equipped with Fireballs was already in pre-combat training when the Japs surrendered. The Fireball never saw combat, but already the principles developed for its operation are being applied to a possible civilian version.

The General Electric-designed thermal jet engine in the Fireball is far more powerful than a conventional engine of the same weight; working alone, it can streak the plane along at approximately 300 miles an hour. The Wright Cyclone gives the craft a maximum range of 1,500 miles cruising at 207 miles an hour, and can develop a speed of 320 miles an hour. Operational features of the plane are good maneuverability, fast climbing, easy handling and speed.

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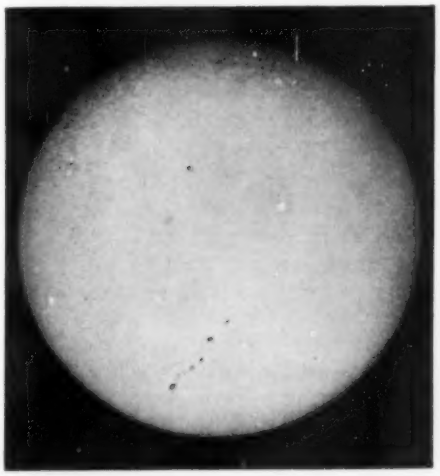
CHEMISTRY

Shark-Repelling Chemical Used for Mackerel Nets

➤ THE SHARK-REPELLING chemical which was developed during the war to save the limbs and lives of "dunked" flyers and sailors promises to be a major money-saver to commercial fishermen. A test made at the suggestion of the U. S. Fish and Wildlife Service by the mackerel seiner *Angie* and *Florence*, operating out of Gloucester, Mass., showed that it was effective in keeping these toothy raiders away from a large net full of mackerel, saving both fish and net.

Shark attacks on heavy netfuls of fish have long been a major problem of commercial fishermen. The loss in fish is serious enough, but damage to the net may be even more so, for a good mackerel net costs several thousand dollars.



NOT A SECRET—The second largest number of sunspots for the year is shown in this photograph by the U. S. Naval Observatory. There are not many large spots, but numerous small ones. The more spots, the more activity there is on the sun. Information about sunspots is no longer a war secret and can be obtained from the Observatory.

Results of the test were reported by Alfred Piscatello, crew member aboard the *Angie* and *Florence*. The vessel had circled a school of mackerel in its long net, when sharks were observed circling near. Two blocks of the shark-chaser were sunk to a depth of 20 or 30 feet in a weighted container, and towed around the net. Additional chemical was spread on the water close to the net. The sharks headed for the catch, but when they came to the black "slick" on the water formed by the chemical they hastily turned tail and swam away.

One shark was caught in the net. Ordinarily this would have resulted in serious damage, for a netted shark lashes out furiously in efforts to escape. But this shark was very much subdued and was easily lifted out by hand.

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MARINE BIOLOGY

DDT Fails to Check All Ship-Fouling Organisms

➤ DDT, THOUGH proven able to prevent barnacles from growing on submerged steel plates, is nevertheless of little value as the main active ingredient for anti-fouling paints to be used on ships' bottoms, G. W. Seagren, M. H. Smith and Dr. G. H. Young of the Mellon Institute declare. (*Science*, Oct. 26). They base their conclusions on an eight month series of experiments on the Florida coast, where the anti-fouling effectiveness of paints containing DDT and the time-honored anti-fouling copper compounds were compared.

In these experiments, as in earlier ones by other workers, the DDT did prove effective in preventing barnacles from taking hold on the steel test panels. The catch lies in the fact that barnacles are not the only organisms that foul up ships' bottoms. Other animals that help to form the troublesome crusts are included in several zoological orders: mollusks, annelids or jointed worms, hydroids, bryozoa and tunicates. The plant kingdom is represented in the growth complex by several kinds of algae or seaweeds. DDT had no measurable effect on any of these, save only barnacles, whereas a conventional-type copper-containing paint was effective against all of them.

The three researchers therefore conclude: "It thus seems unlikely that this toxicant (DDT) can effectively displace cupriferous and/or mercury pigments in the usual ships' bottom paints."

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ELECTRONICS

100,000,000-Volt Betatron

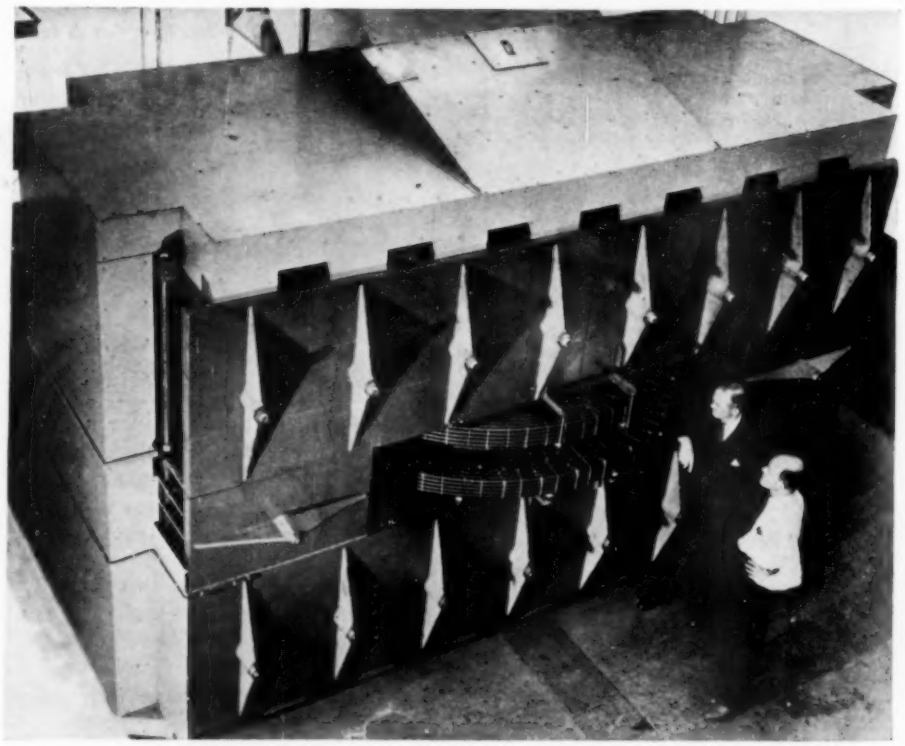
Details of this war-secret instrument are now revealed. It gives out X-rays of power never previously approached.

➤ DETAILS of the war-secret 100,000,000-volt electron accelerator, or betatron, were revealed at the General Electric Research laboratory in Schenectady to a group of newspaper science editors and technical writers who inspected the instrument.

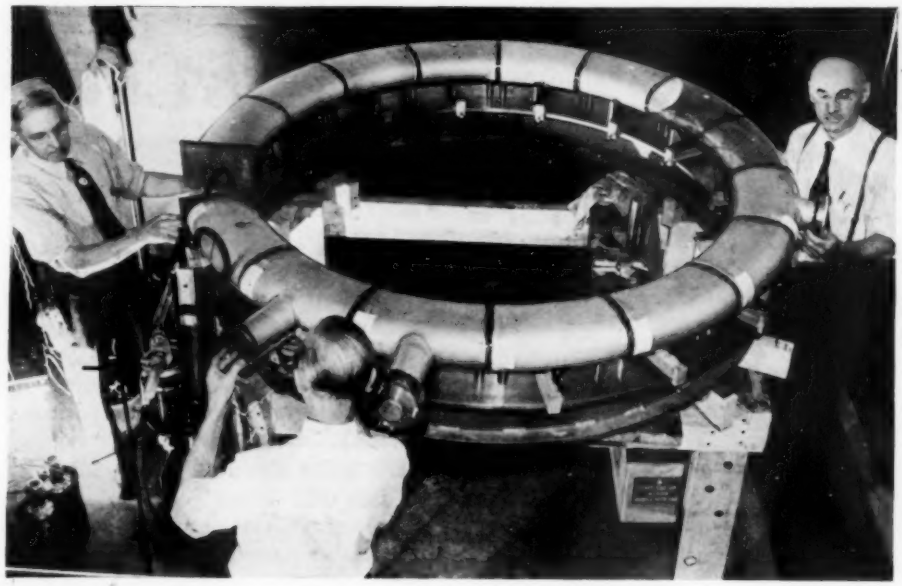
"The new machine gives out X-rays of a power never previously approached," declared Dr. C. G. Suits, director of the laboratory, "and these will penetrate a thickness of metal considerably greater than the rays of our 2,000,000-volt industrial X-ray unit. But even more exciting to us are the possibilities that with the 100,000,000-volt electron stream that produces X-rays of the same energy we can produce other interesting forms of radiation. In fact, we have now arrived at the stage where we can generate in the laboratory radiations which formerly were available only in the cosmic rays, and we are just passing the borders of an entirely new field of atomic research."

The principal part of the betatron is a huge electromagnet, made of 130 tons of laminated silicon steel. In a rectangular opening passing through the magnet from front to back are the pole faces, 76 inches in diameter, surrounded by large coils of insulated one-inch copper conductor. As electric current at 24,000 volts surges through these coils from a bank of condensers, the magnet is energized, the intense magnetic field being concentrated in the horizontal space between the pole faces.

The heart of the machine is a doughnut-shaped vacuum tube of glass. The doughnut has an over-all diameter of 74 inches, while the elliptical tube itself measures eight inches horizontally and



100 MILLION VOLTS—This machine will speed electrons to energies of 100,000,000 volts and produce X-rays of the same power. Dr. E. E. Charlton, left, and W. F. Westendorp are the two scientists at General Electric who have been responsible for the design and construction of this new super X-ray machine.



TUBE IS ASSEMBLED—The heart of the machine is this doughnut-shaped vacuum tube of glass. The doughnut has an over-all diameter of 74 inches, while the elliptical tube itself measures eight inches horizontally and five inches vertically.

five inches vertically. The inner surface of the tube is electrically conducting, so that it will not accumulate a charge that would upset the paths of the electrons within.

Projecting into the doughnut at one point is an electron gun, consisting of a heated filament from which electrons are boiled off. These have an initial impulse of several thousand volts to start them in their orbits inside the doughnut.

The machine operates on ordinary 60-cycle alternating current. Acceleration of the electrons is confined to the first quarter of each cycle lasting 1/240 of a second, during which the current goes from zero to its maximum in one direction. Then it goes back to zero, before building up in the opposite direction.

Just as the end of the quarter cycle is reached, a pulse of current passes through two smaller auxiliary coils on the pole faces. This causes the electrons to spiral away from their orbit and to hit a tungsten target. This causes the generation of X-rays. (See SNL June 3, 1944.)

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MEDICINE

Anemia Remedy

Newly synthesized vitamin, folic acid, gives a "definite upsurge of well-being" to weak, gaunt sufferers from this robber of red blood cells.

➤ PATIENTS weak, gaunt and waxy-white, whose blood was thinned to half or less the normal number of red cells, felt a "definite upsurge of well-being" as they gained fresh red blood from doses of a newly synthesized vitamin, folic acid, Dr. Tom D. Spies of the University of Cincinnati reports. (*Southern Medical Journal,* Nov.)

Associated with Dr. Spies in the studies, conducted at the nutrition clinic at the Hillman Hospital, Birmingham, Ala., were Dr. Carl F. Vilter, Mrs. Mary B. Koch and Mrs. Margaret H. Caldwell.

The synthetic folic acid which swiftly increased the number of immature red blood cells and brought the count of mature red cells and hemoglobin content towards normal is the first synthetic substance to produce this response.

The discovery of its effect is therefore hailed by the editor of the *Southern Medical Journal* as "another milestone in the study of macrocytic anemia."

Macrocytic anemia occurs not only as pernicious anemia but also with liver disease, pregnancy, sprue and pellagra. Liver and liver extract, dried hog's stomach, kidneys and brain have heretofore been the only substances which remedied this macrocytic anemia. Various B vitamins were tried by Dr. Spies and associates. These included niacin, thiamin, riboflavin, calcium pantothenate, inositol, pyridoxine, para-aminobenzoic acid, choline, pyridoxamine and pyridoxal. They had little or no effect.

Synthetic folic acid may not produce all the results that are obtained by doses of potent liver extract. Further studies may show whether this vitamin is the anti-pernicious anemia material in liver or closely related to it.

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MEDICINE

Nobel Prize in Medicine Awarded for Penicillin

➤ THE NOBEL prize in physiology and medicine for 1945 has been awarded to Sir Alexander Fleming, discoverer of penicillin, and Sir Howard W. Florey and Dr. Ernst B. Chain, who fathered its development into a life-saving remedy. The story of penicillin has been brought to SCIENCE NEWS LETTER readers beginning with the announcement of its discovery (*SNL,* May 10, 1930), and in numerous other reports such as those in the following issues: Dec. 4, 1943; Mar. 24, 1945; May 29, 1943; July 4, 1942; Nov. 22, 1941.

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SIR ALEXANDER FLEMING

ZOOLOGY

Kangaroo, Pursued by Jeep Hops at 25 Miles an Hour

➤HOW fast can a kangaroo travel, by putting his tremendous leaps end to end?

Lt. Col. Anselm Keefe, Army chaplain now assigned to duty in the War Department after three and one-half years of service in the Pacific area, can answer that one. It's 25 miles an hour—if the kangaroo is scared enough. He knows, because he clocked a kangaroo himself, chasing it down the road in a jeep.

It happened while Col. Keefe's outfit, a medical unit, was in northern Australia, before Gen. MacArthur's big push up through the islands began.

"We were driving along a road with a high wire fence on either side when we came upon a mob of kangaroos," he relates. "The females promptly jumped over the fence to safety, but one big buck kept going right on down the road, as fast as he could jump.

"In civil life I'm a biologist, so I was curious to see just how fast the animal could travel. I told my driver to keep as close to him as he could, without danger of running into him, while I watched the speedometer. The indicator was holding steady at 25 miles an hour, when our kangaroo saw a small herd of horses in the pasture on the other side of the fence. With a 35-foot leap, he landed in the midst of them, where he knew from past experience he would be safe."

Science News Letter, November 3, 1945

BOTANY

Java Botanical Collections Little Damaged by Japs

➤JAPANESE occupation of Java did not cause any serious damage to the great collections of tropical plants, libraries on the plant sciences and other botanical installations in the Buitenzorg area, headquarters for the study of botany and its application in the Netherlands Indies. Correspondence received by Dr. Frans Verdoorn, editor of *Chronica Botanica* and Advisor to the Board for the Netherlands Indies, indicates that the Japs did not even carry off any of the scientifically valuable pressed specimens from the herbarium at the Buitenzorg Botanic garden.

The scientific staff, however, did not fare so well. Dr. C. G. G. J. van Steenis, well-known research worker on the botany of the Malayan region, tells of having been alternately interned and released during the war period. Six of the staff scientists are known to be dead, and the fate of several others is still unknown.

Despite the vicissitudes of his treatment at the hands of the enemy, Dr. van Steenis kept at his work as well as he could. He writes Dr. Verdoorn that he has almost completed a cyclopedia of botanical collectors, and also a book on Malaysian plant life, besides finishing several shorter scientific papers.

Science News Letter, November 3, 1945

PLANT PHYSIOLOGY

Chemicals in Soil Needed Around Peanut Plants

➤ PEANUTS burrow into the ground instead of developing on the branches of the vine as do the pods of most other legumes because the developing goober requires immediate contact with the nutrient chemical elements in the soil, Dr. L. D. Baver and a group of research associates at the North Carolina Agricultural Experiment Station have discovered.

The peanut has one of the strangest modes of growth of any crop plant. It belongs to the legume family, like peas and beans, and the nut is actually more like a pea than it is like a nut, so far as anatomical structure is concerned. The flowering stem that eventually produces the peanut starts on the vine, above ground, but it grows long and thrusts itself into the soil, where the peanut develops. This peculiar stem is known technically as the "peg."

In the experiments, the objective was to find whether the developing peanut required immediate contact with the soil, to obtain something it could not get indirectly through the sap stream from the roots. Peanut vines were grown with their roots in troughs of soil, duly supplied with fertilizer salts. The pegs were not permitted to sink into the same soil, but were given other soil in separate troughs, with different concentrations of the fertilizer elements.

It was found that for proper development the young peanuts required immediate contact with soil well supplied with lime. If the soil surrounding both roots and pegs was deficient in calcium, the kernels failed to develop, and most of the pegs produced hollow shells. When calcium was added to the soil around the roots only, it failed to have any effect on the nuts, but when it was added also to the soil around the pegs, the peanuts grew normally.

Science News Letter, November 3, 1945

IN SCIEN

CHEMISTRY

Penicillin Is Antitoxic As Well as Germ-Checker

➤ PENICILLIN gains new stature as a remedy against infectious disease as a result of studies reported by Dr. Alden K. Boor and Dr. C. Phillip Miller, of the University of Chicago. (*Science*, Oct. 26.)

The mold chemical has an antitoxic effect as well as the power to stop the growth of disease germs and even kill them. Doses of penicillin, the scientists found, can save mice from death that usually follows injections of the poison produced by one strain of meningococci, germs that cause meningitis. Although this poison kills 89 out of 100 untreated mice, only 33 out of 100 given the poison and treated with penicillin died.

The penicillin did not detoxify the meningococcus poison when mixed with it before injection, however. The scientists are now trying to find whether the detoxifying effect in the animal's body is due to penicillin or to some impurity in commercial preparations of it.

Science News Letter, November 3, 1945

ENTOMOLOGY-GEOLOGY

Florida Limerock Found Good Insecticide-Carrier

➤FINELY ground Florida limerock is found to be an excellent insecticide carrier, or diluent dust, and may be used for DDT, it is now revealed by the University of Florida where extensive tests have been made by its engineering and industrial experiment station. There is no chemical reaction between it and the DDT, even when they are heated together in the presence of water vapor at 100 degrees Centigrade for several days.

Dusting powders containing insecticides are widely used to control crop pests, particularly where wet sprays are less satisfactory. The dust used must be a gritless type that is inert to the insecticide and harmless to the vegetation. Florida has large deposits of a soft variety of limestone, which when ground is easily freed from grit, and which seems especially suitable for a DDT carrier. Samples of the dust may be obtained from the station.

Science News Letter, November 3, 1945

E FIELDS

AERONAUTICS

New Martin Transport Faster Than Prewar Liners

➤ DESIGNED for low-cost operation on continental airlines, the Glenn L. Martin Company's new commercial transport, the 202, is expected to cruise at 250 miles an hour, nearly 100 miles an hour faster than prewar twin-engined airliners.

Looking much like Martin's famed B-26 medium bomber, the 202 will be powered by two Pratt-Whitney radial engines capable of maintaining an altitude of 16,000 feet on one engine. The absolute ceiling with both engines is expected to be 30,000 feet. The low-winged, single-ruddered liner will be equipped with tricycle landing gear and reversible propellers, facilitating short takeoff distances and low landing speeds with a maximum of safety.

Servicing time will be cut down considerably by the installation of panels, opening like bomb-bay doors, to provide easy access to the radio, electrical and hydraulic systems. Particular attention has been given to passenger and crew comfort. Newly designed adjustable seats, indirect lighting and soundproofing, as well as advanced heating and ventilating systems, are expected to minimize travel fatigue.

In addition to the 30 passengers, the 202 will carry a crew of three.

Science News Letter, November 3, 1945

ORDNANCE

Anti-Aircraft Artillery Saved Antwerp From Buzz-Bombs

➤ HOW accurate and effective modern anti-aircraft artillery fire has become is disclosed for the first time in the story of how the port of Antwerp was saved from a buzz-bomb barrage, told by Capt. A. R. Dallmeyer, Jr. (*Coast Artillery Journal*, Sept.-Oct.)

A year ago, after the Allies' rush through northern France and Belgium had resulted in the capture of Antwerp without giving the Nazis time to wreck it before retreating, this port became the one great door through which supplies flowed to the armies attacking Germany on the west. Unable to attack it with bombers, the Nazis started a heavy and persistent effort to knock it out with V-1 buzz-bombs.

Defense, organized by Brig. Gen. Clare H. Armstrong, was entrusted entirely to anti-aircraft artillery, primarily American 90-millimeter and British 3.7-inch rifles. An eight-mile circle was drawn around the port, and a dense concentration of these heavy guns, together with necessary detection and fire-direction instruments, was set up to stop anything approaching it through the air. No barrage balloons or intercepting fighter planes were employed; everything depended on the guns.

Between late October 1944 and March 1945 a total of 4,883 of the Germans' flying weapons were spotted by the detectors. More than 97% of them were destroyed. Only 211 got into the eight-mile protected circle, and none of these was successful enough to hold up port traffic.

Heaviest casualties, as a matter of fact, were to the artillerymen themselves, from the explosion of crippled buzz-bombs that fell near their emplacements.

Science News Letter, November 3, 1945

BIOCHEMISTRY

Small Pores Make Good Egg Shells

➤ SCIENTISTS have found that the shell of the average hen's egg has about 8,000 pores or tiny holes in it. However, there is a great variation in the number and size of these pores. The best egg shells are the ones with a large number of small pores—so small that the escape of gases is difficult and evaporation is slow. Poor shells have fewer pores, but several large ones that make evaporation more rapid. Investigators at several experiment stations have demonstrated that these differences in shell quality are inherited.

Dr. A. L. Romanoff of the poultry department at Cornell University has made a detailed study of porosity in eggs and points out that eggs with poor quality shells lose quality much more rapidly than do those with good shells. This, he says, is particularly important at this time since greater attention is being paid to egg quality.

Workers in the U. S. Bureau of Animal Industry at Beltsville found that more broken eggs occur among those with poor shell quality. However, by using the progeny test method of breeding, they were able to improve egg shell quality considerably. Hens were selected as breeders whose eggs showed the least egg weights loss during the first 14 days of incubation.

Science News Letter, November 3, 1945

ENGINEERING

War Barbed Wire Rusts Out In Three Years or Less

➤ BARBED wire made for use in the war has been coated with only a very small weight of galvanizing. Exposure tests for farm fencing, begun by agricultural engineers at Cornell in 1936, included some samples of wires that had light coatings of galvanizing.

Test records of these wires carry a valuable lesson for farmers who are considering the purchase of surplus stocks of war fencing. After six years of exposure on a hill near Ithaca, samples carrying from 0.25 to 0.27 ounce of zinc galvanizing per square foot of wire surface were nearly completely covered with rust. At the same time, 0.28- and 0.29-ounce samples were 57% and 53% rusty, respectively, while 0.30-ounce samples were only 15% rusty, reports Prof. B. A. Jennings.

Tests were made in cooperation with the American Society for Testing Materials.

It is probable, says Prof. Jennings, that the galvanizing on barbed wire made for war use is very much lighter than the lightest on these tested samples, so it is practically certain that such surplus stock wire will be rusted completely in three years or less.

Science News Letter, November 3, 1945

AERONAUTICS

Removable Cargo Section Speeds Freight Handling

➤ AN AMERICAN of Japanese ancestry, Henry T. Nagamatsu of Cheektowaga, N. Y., has developed a principle of cargo-plane construction that promises greatly to speed the handling of air freight. U. S. patent 2,387,527, issued on his invention, has been assigned to the Curtiss-Wright Corporation.

Instead of unloading and reloading through the conventional side door, which involves holding the plane idle for a long time, Mr. Nagabatsu provides a cargo-holding section that can be detached as a whole and lowered away from the plane on a pneumatic hoist. Waiting for it in a ramped pit below is a truck-trailer unit; the cargo section simply becomes the body of the truck. When this moves off, another truck, with similar cargo section already loaded, takes its place; the section is raised into place and secured, and the plane is ready for immediate flight.

Science News Letter, November 3, 1945

ENGINEERING

Fuel Is Still Scarce

Wartime fuel conservation must continue this winter, even though the war is over. Anthracite burner saves coal by burning little at a time and burning it completely.

By A. C. MONAHAN

➤ THE WAR is over but the fuel shortage is not. For the coming winter, at least, wartime fuel conservation must continue. Production will not permit unrestricted use. There will be enough coal, oil, wood and gas to keep American homes reasonably comfortable, but prewar wasteful practices are out for the present, and should, indeed, be out forever.

Reserves of ordinary fuels, it must be remembered, are not inexhaustible. They will probably be needed for many years to heat homes and run industry's machinery. Scientists may some day develop substitutes; they may find satisfactory ways of using atomic energy or the rays of the sun, but for some years the old standby fuels will continue in use.

Many new types of fuel-saving furnaces have been developed during the war years, but few of them have as yet been widely installed. Some will use less fuel in their fire-boxes but will require electric power to operate, the electricity being generated by fuel burned elsewhere. The total saving may be small.

Among these fuel-saving furnaces is an anthracite burner that burns coal five times as fast as the ordinary furnace, but burns very little at a time and burns it completely. Electric power turns an endless screw to push the coal into a six-inch cylindrical combustion chamber and an electrically-driven blower sucks air through the burning coals.

Utilizes Every Bit

A new bituminous coal stove utilizes every bit of combustible matter in the coal, and burns up all smoke and combustible gases created in the first burning that too often go up the chimney. It operates on a unique scientific principle which combines three factors: an adequate supply of air delivered just where needed by means of fan-driven jets, a series of high-temperature refractory flues, and a path for the gases so that all combustible gases are burned up.

An efficient "whirl flame" combustion type of heater, developed for warplanes, will probably be somewhat widely used in home heating in the future. Its manufacturer is developing a version for home use. It burns a vaporized or atomized gasoline or other liquid fuel in the center of a column of whirling air. Electric power is used to introduce the whirling air column and pressure is required to force the fuel through the atomizer and spray nozzle.

These and other fuel savers will undoubtedly come into wide use in the near future, but few American homes will be so equipped to meet this winter's problem. Better methods of distributing the heat to the rooms of the home, such as the so-called radiant heating, have been developed but they, too, will not be installed early enough to save fuel this season. The furnaces, stoves and distribution of the past decade will continue in full use.

There are many reasons why fuel will not be plentiful during the coming winter. Manpower shortage is one. Many coal miners are still in the armed forces, few new miners have been trained in the past four years and many of the older men will necessarily retire. Coal mining in America is a machine job and only technically trained men are able to operate the mechanical appliances.

Oil will probably not be produced at as high a rate as during the past four years when war needs had to be met. Continuous pumping of most oil wells is not economical. Most of them need rest periods between pumpings. When the oil deep underground close to a well is pumped out, other oil seeps through the sands to replace it. Unless sufficient time is allowed for this seepage, pumps do not work at full capacity.

With the end of the war, certain heavy fuel users will no longer need supplies, it is true. But peacetime factories closed for the war will begin operating again, and many other users of fuel will need quantities far above normal.

Railroads, for instance, are facing heavy problems in meeting conversion conditions and will continue to need vast quantities of fuel. Large numbers of discharged servicemen will return to their homes, and large numbers of former war workers must be transported to new jobs. Thousands of scattered communities need raw materials so that their factories can produce civilian goods. Lumber and other building materials to repair or erect homes must be transported.

American forces in Germany will not need the large quantity of fuel required by the larger forces during the days of actual fighting but they will need American fuel. Local coal is not available in sufficient quantities for them and for the German civilian population. American occupation forces in Japan will probably require fuel from home, as that country produces little coal or oil.

Because of the disrupted condition of European coal mining resulting from the war, vast quantities of American coal are now being sent to the Netherlands, Belgium and France. The lack of mining equipment, manpower, and transportation in those countries prohibits the production of sufficient fuel to keep the homes of their impoverished people reasonably comfortable.

Gloomy Outlook

Fuel conditions may change rapidly in America, but the present outlook is none too good. Now is the time for the American householder to look forward to the coming winter and its heating problems. This means putting the heating plant in first-class order and the house in condition to retain the heat. It means also learning efficiency in firing a furnace or stove.

The heating plant includes not only the furnace but the smoke pipe and chimney. All three must be clean if good results are to be obtained. If a professional is not available to clean them with modern equipment, including a vacuum cleaner, the householder can do it himself.

To clean the furnace a wire brush and a scraper are needed. All surfaces must be cleared of soot so the metal is clean. The brush and scraper can be used to clean the smoke pipe. The chimney is cleaned with a brick wrapped in rags, and raised and lowered on the end of a stout cord from a position on the roof.

When the surfaces are clean all soot and other materials should be removed from the ashpit, and grates and dampers inspected. If the smoke pipe is burned through a new one should be obtained.

With low-volatile bituminous coal, the conical method of firing is recommended.

GETS MORE HEAT—With the "down-draft burner," being placed into the firing door of a furnace by Prof. Julian R. Fellows of the University of Illinois, soft coal can be burned without smoke, thus getting more heat from the fuel.

The coal is carefully piled in a cone in the center of the fire-box. The larger pieces roll to the walls of the firebox where the air will flow freely through them and make a hot ring of flame next to the heating surface. The finer pieces remain in the center and give off gases that are lighted by the flame from the larger outer pieces.

When high-volatile bituminous is used, the V method of piling is recommended. This means heaping the coal in a sloping pile on one side of the fire-box. This leaves red coals on one side and fresh coal on the other. The top of the fresh coal is quickly lighted by the flame from the other and the gases coming from it are consumed as they pass through the burning layer. On the next firing the fresh coal is put on the opposite side.

Burns Evenly

When burning anthracite in the shovel-feed furnace, the top surface of the coal is kept about on a level with the bottom of the feed door. It burns evenly throughout. Care should be taken not to shake the grates too much. Some ashes should be left on them or the hot coals may warp or burn them. Enough of the ashes must be shaken out to permit air to pass to the burning coals above, otherwise complete combustion will not take place.

The principal loss of heat from a poorly constructed house is through crevices around windows and doors, or under the eaves, through the glass in the window panes or through spaces between window sashes and frames.

Stuffing the crevices with rags or with some of the commercially available special materials will stop most of the losses through them. Storm windows prevent leakage through the glass itself. Weather stripping on windows and doors closes the spaces between them and their frames.

Science News Letter, November 3, 1945

AERONAUTICS

Restricted Data by NACA To Be Released Now

➤ WITHHELD from the public by wartime restrictions, over 300 technical reports and notes on aerodynamics, aircraft structures, power plants and general scientific operation problems will soon be released to technical libraries, schools and to the aircraft industry by the National Advisory Committee for Aeronautics.

The announcement of declassification of these reports was made by Dr. G. W. Lewis, director of aeronautical research of NACA. Covering every problem encountered by aeronautical engineers, these data will be of great value to aeronautical engineering students as well as to manufacturers. The data were compiled at the NACA laboratories at Langley Field, Va., and its newly announced supersonic research laboratory in Cleveland.

Science News Letter, November 3, 1945

ASTRONOMY

Scientists on Trail Of Brilliant Fireball

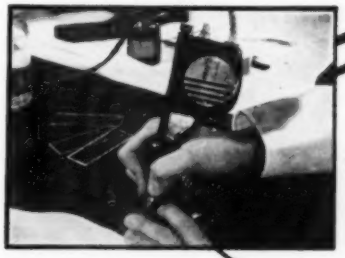
➤ SCIENTISTS are on the trail of a fireball momentarily of full moon brilliance that flashed across middle eastern United States at about 3 a.m. on the morning of Oct. 21.

Fragmentary reports have been received from the New York and Philadelphia area by Dr. Charles P. Olivier of the Flower Observatory, Upper Darby, Pa., who is president of the American Meteor Society.

This visitor from outer space plunging into the earth's atmosphere was accompanied by bluish flashes as seen by some observers. Those who saw this meteor are asked by Dr. Olivier to send in reports to aid in location of its path and where it exploded.

Science News Letter, November 3, 1945

Nearly all of the vitamin B in *rice* is in the outer coating or close to it.



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Do You Know?

Bacteria may attack nearly all kinds of petroleum products, including waxes, oils, kerosene and gasoline, if they are stored in the presence of water.

The common *chipmunk* carries the nuts he gathers in his cheek pouches and has been known to carry four hickory nuts at a time.

One-fourth of the total area under cultivation in the world is devoted to growing *wheat,* and the annual harvest is approximately 140,000,000 tons.

A water-repellent, insulating *liquid,* recently developed, when sprayed on spark plugs and wiring in automobiles protects the engine from moisture even when buckets of water are thrown on it.

Fresh *milk,* frozen with extreme rapidiy at 20 degrees below zero Fahrenheit, may be kept months, and when thawed out is as appetizing and tasty as it was in its original condition.

A new form of *hormone spray* containing naphthalene acetic acid in emulsifiable oil, applied to orchard trees from an airplane, reduces the pre-harvest drop of apples and pears caused by winds.

Future buildings may, in numbers far exceeding present structures be windowless and lighted entirely by artificial light, or be constructed with side walls and doors of glass and with mirrors for inside walls and ceilings.

Turkey eggs for eating may soon join the familiar chicken eggs on the market as a result of the development of a small-sized turkey which is a heavy layer and produces eggs throughout most of the year.

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ZOOLOGY

NATURE RAMBLINGS by Frank Thone

Proximity Sensings

➤ BATS were the original discoverers of the principle of the proximity fuze.

These flying mammals have long excited man's wonder at their ability to fly about in the near-darkness of caves, or outdoors in the deepening dusk, without ever colliding with the walls or with each other. Small wonder that our ancestors were inclined to look upon them as endowed with darkly supernatural powers —even to the extent of picturing Satan as having bat's wings!

Modern scientists, insatiably curious and unafraid of the Devil himself, have done some rather extensive experimenting on this uncanny ability of bats to sense their way around in the dark. They have tried putting up obstacles that must be as difficult for bats to see as for human beings, things like stretched wires and suspended strings—and the bats would avoid these as readily as they did larger and more obvious lumps of matter.

Finally the secret was hit upon. Bats, it was discovered, constantly give out exceedingly shrill little chirpings while in flight. Probably the chirps that we hear are the lowest-pitched of the bat's tones, at that—higher notes that they pipe are above the human ear's perceptive ability. Echoes of these high-pitched notes, returned to the bat's ears by the surfaces of obstacles, warn of impending collisions, and the bat's exquisitely-balanced neuromuscular flight controls automatically go into action and cause a saving zoom or swerve.

Now this is essentially what the proximity fuze does, except that in its case the echo-producing vibrations are those of ultra-short radio waves in the ether instead of ultra-short sound waves in the air. But the principle is the same—an apparatus that sends out exploratory vibrations and catches their returning echoes. Of course, the resultant behavior is different: the bat swerves, the bomb blows up. But that is a mere matter of detail.

The analogy promises to become closer, now that the war is over and men are looking for peacetime applications for war-born devices. It is proposed to equip airplanes with adaptations of the proximity fuze, with suitable electronic relays to bring about an automatic avoiding maneuver when the plane approaches an unseen obstacle in darkness or fog.

If this comes to pass, it will be a curious closing of a cycle. When what we now know as radar was first invented, it was called an "absolute altimeter": the echoes of short radio waves sent out from a plane were to warn of the proximity of dangerous obstacles like jutting mountain-tops, and enable the pilot to avoid them. Now it is proposed to make the avoidance independent of human eyes on the instrument board and hands on the controls—to turn the plane into a kind of mechanical super-bat.

Science News Letter, November 3, 1945

AERONAUTICS

Entire Airplane Consists Of One Thick Wing

➤ WHAT LOOKS like the ultimate development in the "flying wing" type of aircraft is offered for patent 2,384,893 by Prof. Louis H. Crook, aerodynamics specialist on the physics faculty of the Catholic University of America. The entire craft consists of one thick wing, with control surfaces at its trailing edge and its outer ends. Everything else is inside the wing, even the propellers. Two are mounted; one at the wide mouth of a tunnel that tapers to a choke near the center of the wing, the other at the choke, just before the tunnel widens again toward the outlet.

Science News Letter, November 3, 1945

Root *vegetables* should be stored in closed containers and at a temperature at least as low as 40 degrees Fahrenheit.

Apple trees have *"measles"* but not the kind the human race experiences; diseased trees have irregular, dead, brown-colored pockets of tissues scattered throughout the interior of the bark.

Formaldehyde, at the rate of a million pounds a month, will be produced at a new plant at Springfield, Ore.; it is an essential chemical in the production of synthetic resins and plastics.

ORTHOPEDICS

Better Artificial Limbs

Will be the result of research now in progress under the direction of a committee of the National Research Council. Perfect substitutes too much to expect.

➤ BETTER artificial arms and legs for veterans and civilians can be expected as a result of research now under way in the services and under the direction of a committee of the National Research Council. This much became clear as a Congressional committee on aid to the physically handicapped, under the chairmanship of Rep. Augustine B. Kelley of Pennsylvania, opened hearings.

Veterans or their friends who expect the perfect or ideal in the way of an artificial hand, leg, arm or foot, however, will probably be disappointed.

"Even the best conceivable artificial arm or leg can be but an inadequate substitute for the member it replaces," Dr. Paul E. Klopsteg of Northwestern University, chairman of the National Research Council's committee on prosthetic devices, has already pointed out.

Even after full recovery from an amputation, the muscles are shrunken and have much less power and force than those of the original arm or leg, Dr. Klopsteg explained. His committee is studying devices for supplying external power, including mechanical, electrical, hydraulic and pneumatic.

Army research on the problem of artificial limbs is going forward at its amputation centers. In these, the program coordinates the work of the surgeons and physiotherapists who prepare the stump, the work of the men who fit the devices, of those who train amputees to use the devices, and the development and standardization of the artificial arms and legs and hands.

The Army has about 14,000 major amputation casualties. These include cases ranging from loss of all fingers of one hand or half of one foot to the loss of both arms above the elbow. This last is one of the most serious of all. Fortunately it is a rare occurrence. Only four Army veterans have this disability.

Standardization of parts is one of the projects the Army has been working on, in cooperation with the National Bureau of Standards and artificial limb manufacturers. This has already been accomplished for the foot and ankle and it is hoped standards for knees will be completed shortly.

Setting standards for the best possible knee, ankle or other part was somewhat handicapped in Army centers by the fact that, naturally enough, every time a new device was being tried, all the amputees wanted to try it. This made scientific comparisons difficult. Making changes was also difficult, with as many as 1,600 amputees in Army hospitals at one time. One hospital had 400 amputation patients in one month.

The biggest difficulty seems to be with artificial hands.

"You cannot replace the normal hand," Col. Leonard P. Peterson, of the Surgeon General's Office in the War Department stated.

At the same time he said that the present artificial hand is not as good as it should be. One difficulty in constructing hands is that the more that is put in for improving appearance and increasing the usefulness of the hand, the heavier it becomes. The higher the amputation, the less likely the amputee is to wear an artificial hand and arm and the less likely he is to get good out of one.

Legs can be made to approach the normal leg much more closely. The Army is now fitting metal legs at one center, plastic ones at another and fiber ones at five centers. Study of the results will perhaps show which is best, although there may always be individual variations in the needs of different amputees.

Even with a good artificial leg, best results will not be obtained unless the wearer learns how to use it, and the same of course is true of hands and arms. This and the proper treatment of the stump are two points on which veterans may have the edge over civilian amputees, since the Army gives much attention to both points.

Search for the best ways of "bonding" parts of the prothesis, for example the calf to the ankle joint, is also under way at Army centers.

While many veterans and their friends may be dissatisfied with the artificial arms and legs now being supplied by the Army, Col. Petersen pointed out that the Army only has the problem during war and that amputees only started coming in a year and a half ago.

Science News Letter, November 3, 1945

Most *cabbage* seed used in the United States is obtained from plants grown on the Pacific coast because that area is better suited for cabbage seed production.

Tropical *cyclones* on the Gulf and Atlantic coasts are called hurricanes; in the South Pacific and the Indian ocean, cyclones; in the Philippine-Japan region, typhoons, and on the northwestern Australian coast, willy-willies.

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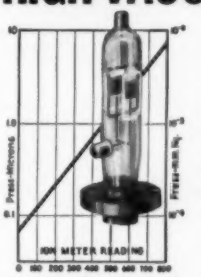

IONIZATION GAUGE COLD CATHODE TYPE

Measures high vacuums with galvanometer down to 10-4 mm. Hg. in electron microscopes and other high vacuum apparatus. Utilizes discharge current between electrodes in magnetic field. Extremely sensitive and accurate.

The Universal line includes two types of vacuum gauges of special interest to users of electron microscopes — the Universal highly sensitive cold cathode ionization gauge and the rugged Universal thermocouple gauge.

Both gauges are standard equipment on R.C.A. electron microscopes — and can be supplied for other high vacuum work.

Universal offers a complete production service in special glass and tube work — including metal-to-glass seals of all types and sizes. Your problems will receive our immediate and courteous consideration.

THERMOCOUPLE GAUGE

Measures low pressure levels with millivoltmeter which indicates variation in thermocouple voltage due to changes in vacuum. Ideal for systems requiring rapid verification of high vacuums. Heater and instrument terminals fit standard 8-prong tube socket.

UNIVERSAL X-RAY PRODUCTS INC.

1800-H N. FRANCISCO AVE., CHICAGO 47, ILL.

PUBLIC HEALTH

Health Campaign

Men and women by the thousands are voluntarily lining up at health centers in Savannah, Ga., to be tested for TB and venereal diseases.

➤ THOUSANDS of men and women from every walk in life are lining up at health centers in Savannah, Ga., to wait their turn for chest X-rays and blood tests as that city wages a 45-day campaign against tuberculosis and venereal disease.

The campaign, scheduled to run from Oct. 15 to Nov 30, is breaking records for disease fighting. It is the first time in public health history that syphilis and tuberculosis have been combined in case-finding. And while Birmingham, Ala., pioneered last spring in a mass attack on syphilis and gonorrhea, the campaign there resulted from a state law requiring blood tests, and treatment where needed, for all persons between the ages of 14 and 50 years.

Savannah citizens are showing that no law is needed to make people take these important steps for protecting their own and their community's health. The campaign here is on a voluntary basis. Yet in the first four days of the campaign 5,719 chests have been X-rayed to detect tuberculosis and 5,719 blood samples have been taken to test for syphilis.

The blood testing laboratory, set up to run 1,000 tests a day, has already had to be reorganized and enlarged to handle more than twice that number daily.

At one center, on the third evening of the campaign, men and women stood in line for three hours, waiting of their own accord for the rushed staff of doctors and nurses to get the X-ray pictures made and the blood samples taken.

"TB can be cured in its early stages. An X-ray today may save your life tomorrow."

When you read that message on eight-foot high posters on the main business streets of your town, see it repeated in street car cards and in the newspaper and hear it over the radio, you take action, it appears from the overwhelming response here. Whether you are a member of the women's auxiliary of the state medical society or a Negro laborer living in a public housing project, you follow the directions on the poster and go to the health center or your physician.

Here, as in Birmingham last spring, the streets and cars are also placarded with the notice that treatment of syphilis with penicillin can be completed in nine days and that blood tests will be given at the health center.

Syphilis patients go to the U. S. Public Health Service's rapid treatment hospital. Tuberculosis patients go to another hospital for the rest and other measures that are part of the treatment of this disease.

Examination and penicillin treatment for gonorrhea is also being given but is not the featured part of the campaign.

Science News Letter, November 3, 1945

Photo courtesy H-B Instrument Co.

MUELLER BRIDGE Measures Many Lab Temperatures At Top Accuracy

For making rapid, high-precision temperature measurements, an excellent choice is the Type G-2 Mueller Bridge shown in use above. Unaffected by ambient temperature, it is capable of greater accuracy, between —190 and +500°C, than any other means available; its limit of error being only a few hundred-thousandths of an ohm, or a few parts per million, whichever is greater.

For further information, see Catalog E-33C(1).

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● Just Off the Press ●

CALABASHES AND KINGS: An Introduction to Hawaii—Stanley D. Porteus—*Pacific Books,* 245 p., illus., $3.50.

CLASSIC DESCRIPTIONS OF DISEASE, With Biographical Sketches of the Authors—Ralph H. Major—*C. C. Thomas,* 667 p., illus., $6.50. Third ed., revised and enlarged.

FROM PEARL HARBOR INTO TOKYO: The Story as Told by War Correspondents on the Air—Paul Hollister and Robert Strunsky, eds.—*Columbia Broadcasting System,* paper, 312 p., illus., 25 cents.

MY TWENTY-FIVE YEARS IN CHINA—John B. Powell—*Macmillan,* 436 p., $3.50. A newspaper correspondent's experience, covering the years 1917 through 1942.

MODERN MAN IS OBSOLETE—Norman Cousins—*Viking,* 59 p., $1. A discussion of the problems raised by the birth of the Atomic Age.

THE MANAGEMENT OF THE MIND—Milton Harrington—*Philosophical Lib.,* 200 p., $3. Edited from posthumous manuscripts and notes by Ralph B. Winn.

PSYCHIATRY IN MODERN WARFARE—Edward A. Strecker and Kenneth E. Appel—*Macmillan,* 88 p., $1.50.

OUT OF CARNAGE—Alexander R. Griffin—*Howell, Soskin,* 327 p., $3. A description of technical and medical discoveries made under the stress of war.

TABLE OF ARCSINX—Lyman J. Briggs, Arnold N. Lowan and others—*Columbia Univ. Press,* 121 p., $3.50. Prepared by the Mathematical Tables Project under the sponsorship of the National Bureau of Standards.

THE SOCIAL IMPACT OF SCIENCE. A Select Bibliography, With a Section on Atomic Power—*Supt. of Doc.,* paper, 51 p., 15 cents. Prepared by the Library of Congress for the Subcommittee on War Mobilization of the Committee on Military Affairs, U. S. Senate.

A TRIP THROUGH THE NEW BUILDING OF MELLON INSTITUTE—*Mellon Institute of Industrial Research,* 20 p., paper, illus., free. Third ed.

Science News Letter, November 3, 1945

ANYONE CAN USE A SLIDE RULE

Absolutely no math background needed if you have the **PRACTICAL SLIDE RULE MANUAL** by J. M. Klock, Mathematician for the U. S. Navy and former instructor in the Detroit Public Evening Schools. An absolutely non-technical explanation of how to use a slide rule for the fundamental math calculations. **STUDENTS** of all math, science, and technical subjects will find the use of a slide rule to be a great aid in their work. **SHOP AND TECHNICIANS:** special applications made to formulae from mathematics, engineering, aeronautics, air navigation, etc. The slide rule gives rapid solutions to all the basic formulae. **OFFICE:** and business administration applications are numerous. The slide rule is especially valuable in per cent and interest work, and cost accounting. The booklet includes chapters on these subjects. The slide rule is also a valuable rapid estimator.

Large illustrations. Simple and non-technical explanations. Based on 9 terms of teaching adults. With this booklet anyone who knows the simplest arithmetic can really learn the slide rule. Starts from a simple reading of the scales, and goes on through the most advanced practical work. Booklets are sent postpaid by return mail. Send today, and learn a skill that will help you during post-war times. Send $1.00 to

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Every Library Should Have a Copy

• Books of the Week •

➤ MANY PERSONS who would be little interested in the names of wildflowers become acutely interested in the identity of the unsown—and usually unwanted—plants that spring up in numbers on the lawn or in the vegetable garden. A flora of these hardy though unwelcome volunteers is offered by John M. Fogg, Jr., in WEEDS OF LAWN AND GARDEN (*Univ. of Penna. Press*, $2.50). Well-drawn, generous-sized line illustrations make identification easy, and brief, informal text descriptions give an idea of the habits of the plants and sometimes suggestions on what to do about them.

Science News Letter, November 3, 1945

➤ EVEN BEFORE the bursting atom had produced a military revolution and threatened a political one, it was playing hob with philosophies invented in times when atoms were really atomic, that is, indivisible. The new physics is producing a new metaphysics. The old, safe, clockwork cosmos of nineteenth-century materialism has to give way to something newer which, if less certainly predictable and dogmatically definable, is at least a closer approach to truth. In AFTER MATERIALISM—WHAT?, Sir Richard Clifford Tute tries his hand at some of the answers. (*Dutton*, $3.)

Science News Letter, November 3, 1945

➤ SCIENTISTS who can conduct research and also write interestingly are rare; more rarely still do they come in pairs. One such dually-gifted team is Carroll Lane Fenton and Mildred Adams Fenton. They have done much creditable field work in geology; now, in THE STORY OF THE GREAT GEOLOGISTS, they trace the steady evolution of their science through life sketches of the men who found the facts and argued out the theories. (*Doubleday, Doran*, $3.50.)

Science News Letter, November 3, 1945

➤ BRIEFER than most college texts in botany, L. Edwin Yocum's PLANT GROWTH nevertheless covers essential points adequately. Its primary emphasis on function rather than form is especially to be commended. (*Cattell*, $3.)

Science News Letter, November 3, 1945

➤ NEWEST ADDITION to the Pacific World Series is PLANT LIFE OF THE PACIFIC WORLD, by Elmer D. Merrill (*Macmillan*, $3.50). Of course, a one-book presentation cannot do more than outline the enormous, complex and diversified botany of this great area; but it has the merit of meeting an immediate need, and it is hoped will help to stimulate collections and note-taking that will eventually synthesize into the complete Botany of the Pacific Area.

Science News Letter, November 3, 1945

➤ ONE of the best known of living paleontologists, Roy Chapman Andrews, presents in MEET YOUR ANCESTORS a compact popular account of present knowledge of ancient man and his possible ancestry. This book is especially valuable for its inclusion of recent discoveries, particularly in this country. (*Viking*, $3.)

Science News Letter, November 3, 1945

➤ LITERATURE on Southeast Asia is growing in proportion to popular interest in this area, recently one of the many scenes of war. However, the timeliness of H. G. Deignan's new monograph, THE BIRDS OF NORTHERN THAILAND, is largely a coincidence, for the book was in preparation long before the war. Ornithologists will feel indebted to the Smithsonian Institution for producing this excellent publication. (*Supt. Publ. Documents*, $1.25.)

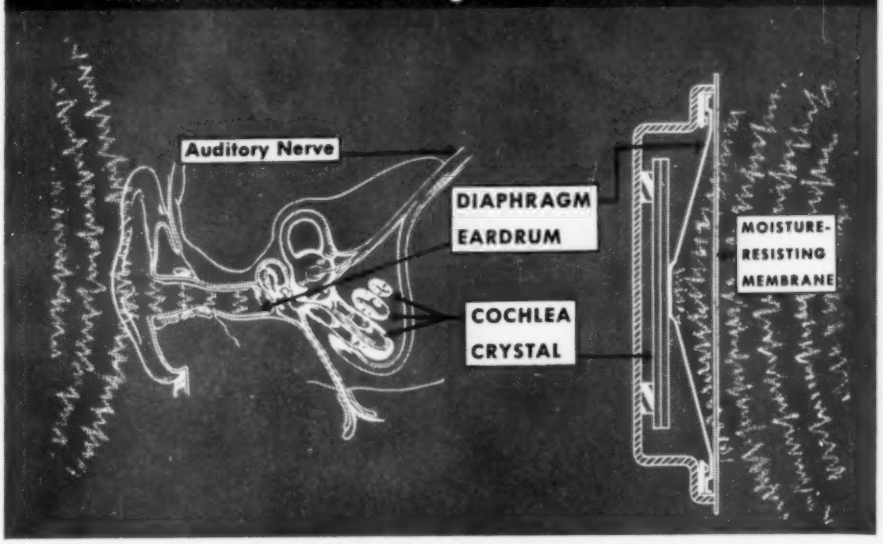
Science News Letter, November 3, 1945

➤ ANILIN'S myriad rainbow-tinted derivatives so dominate the world's dye-vats that it is difficult for us to realize that they are all creations of yesterday, that our grandparents knew fabrics colored with extracts of roots, barks and berries. Douglas Leechman, in his little book, VEGETABLE DYES FROM NORTH AMERICAN PLANTS, recaptures some of this all-but-lost lore of colors and puts it into forms that the least experienced amateur can readily use. It should be appreciated especially by persons interested in handcrafts. (*Webb*, $1.25.)

Science News Letter, November 3, 1945

A strain of *bees* resistant to American foulbrood, one of the worst bee diseases, is being produced through breeding and selection with promising results by the U. S. Department of Agriculture.

What Makes a Good Hearing Aid . . . No. 5 of a Series



MICROPHONE

• The crystal microphone should be considered as the "ear" of a hearing aid.

The diaphragm of the microphone—an "eardrum" that vibrates to sound waves—should pick up sound from all directions. The microphone should be mounted on shock absorbent material in such a way as to protect the diaphragm from mechanical and frictional noises.

Sound energy is converted into electrical energy, which is comparable to cochlear nerve impulses, by means of a Rochelle Salt Crystal which possesses the piezo-electrical property of responding to sound frequencies transmitted by the diaphragm. These delicate crystalline "nerves" should be sealed into the microphone to protect them from moisture.

Good hearing aid performance depends upon the engineering and precision manufacture of its miniature microphone—its sensitive electro-mechanical "ear."

To design the microphone for the new WESTERN ELECTRIC Model 63 Hearing Aid, Bell Telephone Laboratories drew on its vast experience in telephony, radio, movie and public address sound systems.

THIS SERIES, BASED UPON RESEARCH CONDUCTED BY BELL TELEPHONE LABORATORIES IS PUBLISHED IN THE INTEREST OF THE HARD OF HEARING AND THEIR PHYSICIANS

Western Electric Hearing Aids

MADE TO BELL TELEPHONE STANDARDS

•New Machines and Gadgets•

❁ *BRUSH without bristles, recently patented, for use as a cloth or scrubbing brush, has a series of spirally-rolled pieces of rubber in place of the usual bundles of bristles.*

Science News Letter, November 3, 1945

❁ *BATTLESHIP TOY has a deck crowded with toy soldiers, guns and other shiplike articles that are scattered widely when a spring of a mousetrap-type hits the under side of the deck. The spring is released only if a small bomb, dropped by hand, hits the broadened top of a pin that extends through the deck.*

Science News Letter, November 3, 1945

❁ *COMBINATION goggles and eyeshades are made of flexible tinted plastic material. The transparent protective goggles fit over the eyes, extending down each side of the nose and back over the temples. The semi-transparent eyeshade is hinged to the goggles.*

Science News Letter, November 3, 1945

❁ *PRUNING TOOL, operated hydraulically, has a fixed blade, and a movable blade operated by fluid pressure. Flexible hose connects the pruning head with a pressure tank carried by the operator, the pressure being by foot-action.*

Science News Letter, November 3, 1945

❁ *SCORCH from a flatiron can be removed from shirts and dresses in only 10 minutes with a special lamp that radiates long-wave ultraviolet rays instead of using sunlight, which requires many hours of exposure. The scorched area of the shirt shown in the picture is dampened slightly before the ultraviolet rays are applied.*

Science News Letter, November 3, 1945

❁ *TO CONVERT alternating to direct current for battery charging and many other purposes, selenium rectifiers are now made with aluminum in place of iron or similar metals to give lightness. A method of sealing the units hermetically permits their use in any climate.*

Science News Letter, November 3, 1945

❁ *MECHANICAL LEVER, a device using a pendulum free to swing in any direction instead of a liquid in a tube, is housed in a flat-bottomed box with a transparent hemisphere for a cover. Above the ball-suspension of the pendulum, an upward-extending pointer shows the levelness on the graduated cover.*

Science News Letter, November 3, 1945

❁ *BURIAL URN, to hold the ashes of a cremated body, is made of a ferrous sheet metal with a heavy coating of corrosion-resistant porcelain. The opening is in the center of its inverted cup-shaped base and can be properly sealed.*

Science News Letter, November 3, 1945

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, *1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 283.*

Question Box

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